

WHAT IS CLAIMED IS:

1. An image processing method comprising:
  - a numerical signal generation step of sequentially generating and outputting regular binary numerical signals in synchronism with a clock signal;
  - a bit exchange step of generating and outputting, from the output signal in said numerical signal generation step being managed as an input signal, a signal that order of bits in the input signal has been exchanged or a signal that the bits in the input signal have been reversed; and
  - a control step of controlling the bit order exchange operation or the bit reversal operation in said bit exchange step,
- wherein image data divided into pixel data and one-dimensionally arranged and stored in a memory is read and output in synchronism with the sequential operation in said numerical signal generation step, and the output signal generated in said bit exchange step is read and output as an address signal, so that a rotation/reversal process to a former image is performed.

2. A method according to Claim 1, wherein an input two-dimensional image is represented by an aggregate of the pixel data, and all the pixel data are one-dimensionally arranged and transferred to the

memory in synchronism with the clock signal.

3. A method according to Claim 1, wherein, in said bit exchange step, plural kinds of bit exchanges  
5 can be performed, and one of the plural kinds of bit exchanges is selected and output according to an angle of rotation or a kind of reversal.

4. An image processing apparatus comprising:  
10 numerical signal generation means for sequentially generating and outputting regular binary numerical signals in synchronism with a clock signal;  
bit exchange means for generating and outputting, from the output signal of said numerical signal  
15 generation means being managed as an input signal, a signal that order of bits in the input signal has been exchanged or a signal that the bits in the input signal have been reversed;  
control means for controlling the bit order  
20 exchange operation or the bit reversal operation of said bit exchange means; and  
storage means for storing image data,  
wherein the image data divided into pixel data and one-dimensionally arranged and stored in said storage  
25 means is read and output in synchronism with the sequential operation of said numerical signal generation means, and the output signal generated by

said bit exchange means is read and output as an address signal, so that a rotation/reversal process to a former image is performed.

5           5. An apparatus according to Claim 4, wherein an input two-dimensional image is represented by an aggregate of the pixel data, and all the pixel data are one-dimensionally arranged and transferred to said storage means in synchronism with the clock signal.

10           6. An apparatus according to Claim 4, wherein said bit exchange means can perform plural kinds of bit exchanges, and selects and outputs one of the plural kinds of bit exchanges according to an angle of  
15 rotation or a kind of reversal.

            7. An image processing method comprising:  
            a numerical signal generation step of sequentially  
20 generating and outputting regular binary numerical signals in synchronism with a clock signal;  
            a bit exchange step of generating and outputting, from the output signal in said numerical signal generation step being managed as an input signal, a  
25 signal that order of bits in the input signal has been exchanged or a signal that the bits in the input signal have been reversed; and  
            a control step of controlling the bit order

exchange operation or the bit reversal operation in  
said bit exchange step,

wherein image data is written in a memory in  
synchronism with the sequential operation in said  
5 numerical signal generation step and by using the  
output signal generated in said bit exchange step as an  
address signal, and the image data written in the  
memory is read according to addresses of predetermined  
order, so that a rotation/reversal process to a former  
10 image is performed.

8. An image processing apparatus comprising:

numerical signal generation means for sequentially  
generating and outputting regular binary numerical  
15 signals in synchronism with a clock signal;

bit exchange means for generating and outputting,  
from the output signal of said numerical signal  
generation means being managed as an input signal, a  
signal that order of bits in the input signal has been  
20 exchanged or a signal that the bits in the input signal  
have been reversed;

control means for controlling the bit order  
exchange operation or the bit reversal operation of  
said bit exchange means; and

25 storage means for storing image data,

wherein the image data is written in said storage  
means in synchronism with the sequential operation of

said numerical signal generation means and by using the output signal generated by said bit exchange means as an address signal, and the image data written in said storage means is read according to addresses of  
5 predetermined order, so that a rotation/reversal process to a former image is performed.

9. A storage medium which stores a control program to control an image processing apparatus, said  
10 program comprising:

a numerical signal generation module of sequentially generating and outputting regular binary numerical signals in synchronism with a clock signal;  
a bit exchange module of generating and  
15 outputting, from the output signal in said numerical signal generation module being managed as an input signal, a signal that order of bits in the input signal has been exchanged or a signal that the bits in the input signal have been reversed; and  
20 a control module of controlling the bit order exchange operation or the bit reversal operation in said bit exchange module,

wherein image data divided into pixel data and one-dimensionally arranged and stored in a memory is  
25 read and output in synchronism with the sequential operation in said numerical signal generation module, and the output signal generated in said bit exchange

module is read and output as an address signal, so that a rotation/reversal process to a former image is performed.

5           10. A storage medium which stores a control program to control an image processing apparatus, said program comprising:

            a numerical signal generation module of sequentially generating and outputting regular binary  
10           numerical signals in synchronism with a clock signal;  
            a bit exchange module of generating and outputting, from the output signal in said numerical signal generation module being managed as an input  
            signal, a signal that order of bits in the input signal  
15           has been exchanged or a signal that the bits in the input signal have been reversed; and

            a control module of controlling the bit order exchange operation or the bit reversal operation in said bit exchange module,  
20           wherein image data is written in a memory in synchronism with the sequential operation in said numerical signal generation module and by using the output signal generated in said bit exchange module as an address signal, and the image data written in the  
25           memory is read according to addresses of predetermined order, so that a rotation/reversal process to a former image is performed.

11. An image processing method comprising:

an input step of inputting a block image and  
positional information of the block image;

an image rotation/reversal processing step of  
5 rotating or reversing the input block image by a block,  
and outputting the rotated or reversed block image; and

a conversion step of converting the positional  
information of the input block image into the  
positional information of the image after the rotation  
10 or the reversal,

wherein the conversion in said conversion step is  
a process corresponding to the content of the image  
rotation or the image reversal in said image  
rotation/reversal processing step, and in the  
15 conversion, the positional information for the entire  
image before the rotation or the reversal where the  
block image stands is converted into the positional  
information for the entire image after the image  
rotation or the image reversal in said image  
20 rotation/reversal processing step, and the converted  
positional information is added to the rotated or  
reversed block image and output.

12. An image processing apparatus comprising:

25 input means for inputting a block image and  
positional information of the block image;

image rotation/reversal processing means for

rotating or reversing the input block image by a block,  
and outputting the rotated or reversed block image; and

conversion means for converting the positional  
information of the input block image into the

5 positional information of the image after the rotation  
or the reversal,

wherein the conversion by said conversion means is  
a process corresponding to the content of the image  
rotation or the image reversal by said image

10 rotation/reversal processing means, and in the  
conversion, the positional information for the entire  
image before the rotation or the reversal where the  
block image stands is converted into the positional  
information for the entire image after the image  
15 rotation or the image reversal by said image  
rotation/reversal processing means, and the converted  
positional information is added to the rotated or  
reversed block image and output.

20 13. A storage medium which stores a control  
program to control an image processing apparatus, said  
control program comprising:

an input module of inputting a block image and  
positional information of the block image;

25 an image rotation/reversal processing module of  
rotating or reversing the input block image by a block,  
and outputting the rotated or reversed block image; and



a conversion module of converting the positional information of the input block image into the positional information of the image after the rotation or the reversal,

5            wherein the conversion in said conversion module is a process corresponding to the content of the image rotation or the image reversal in said image rotation/reversal processing module, and in the conversion, the positional information for the entire  
10 image before the rotation or the reversal where the block image stands is converted into the positional information for the entire image after the image rotation or the image reversal in said image rotation/reversal processing module, and the converted  
15 positional information is added to the rotated or reversed block image and output.